

Expert Systems and Machine Learning

medium.com/@manveetdn/expert-systems-and-machine-learning-f48a24d0d642

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An Expert System is a system that gives reasoning about its behaviour and how to solve a problem. They are built to perform at a human expert level in a narrow, specialised domain. It had the high-quality performance. no matter how fast the system can solve the problem, the user will not be satisfied if the result is wrong.

Why do we need classification??

Where do we use Binary classification??



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Capstone project in which binary classification is used to detect whether any letter is present or not in the particular image

Reason behind using the Binary Classification is that initially what we need to know is the whether the thing we wanna find is present or not it's just like a Boolean value saying **TRUE/FALSE**. In the final capstone project the first task we have to do is we have to find whether the the image contains any letter or not. Like that the binary classification will be helpful for us.

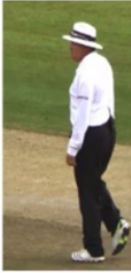







Human Decision Making

The example taken in the below picture is that seeing the patient symptoms and then deciding the what the fever is whether dengue, malaria anything else. Here the disease of the patient is decided based on the different symptoms and in the same way based on different symptoms the disease is encountered. Even in our favourite sport Cricket the decision whether it is **LBW out or NOT** is also based on various factors.

The below are the descriptions of the above two examples

Inputs					Output
Rash	fever	headache	cold cough	vomiting	
					
					
					
					
					

Malaria or not based on various symptoms

Inputs						Output
Pitching in line	Impact	Height	no ball	shot attempted	LBW out	
						 
						
						
						
						

The LBW out or not based on various parameters

Here the various symptoms in each case act as the Inputs for the final Output is the decision whether the symptoms show malaria or not (True/False).

Here the various parameters like : Pitching, Impact, Height, no ball like that many parameters act as input and finally the output is calculated based on whether it's a LBW or not.

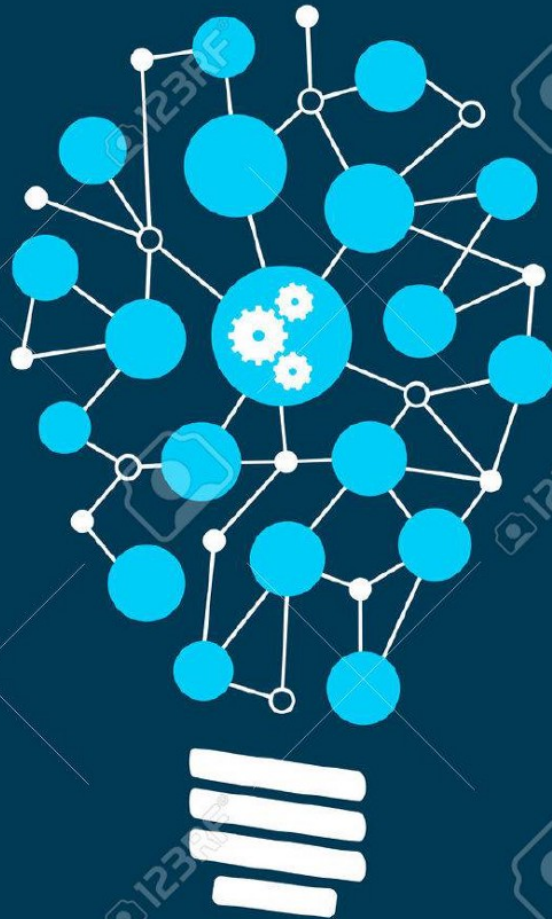
Based on all the above inputs finally the decision is made whether it's LBW out or not by a human (Umpire in that case). Now we all need the machine to perform the task. So we will write whole sort of **if else** statements and assuming various conditions and we will find the result.

The Expert Systems are used in different cases till today.

1. Used to find structures in Organic Chemistry (1995)
2. In Space programs for machine control based on various factors like temperature pressure etc (1990)
3. Giving loans in Banks based on various factors like salary, family income, properties (1990)
4. Conversation systems like a Bot (1995)
5. Arabic Speech synthesis systems (2018)

Machine Learning

MACHINE LEARNING



We will have many cases in our daily lives we need to think beyond the Expert Systems. Expert System fails when we have a loads and loads of data to compare with various sort of parameters we have to compare make a decision Expert System fails in this case because we have write a whole lots of set of rules to and even the code becomes complex while executing making a big decision.

Machine learning is all about how you make the machine to learn from data.Using various functions

If $x_1, x_2, x_3, \dots, x_n$ is the data that you have

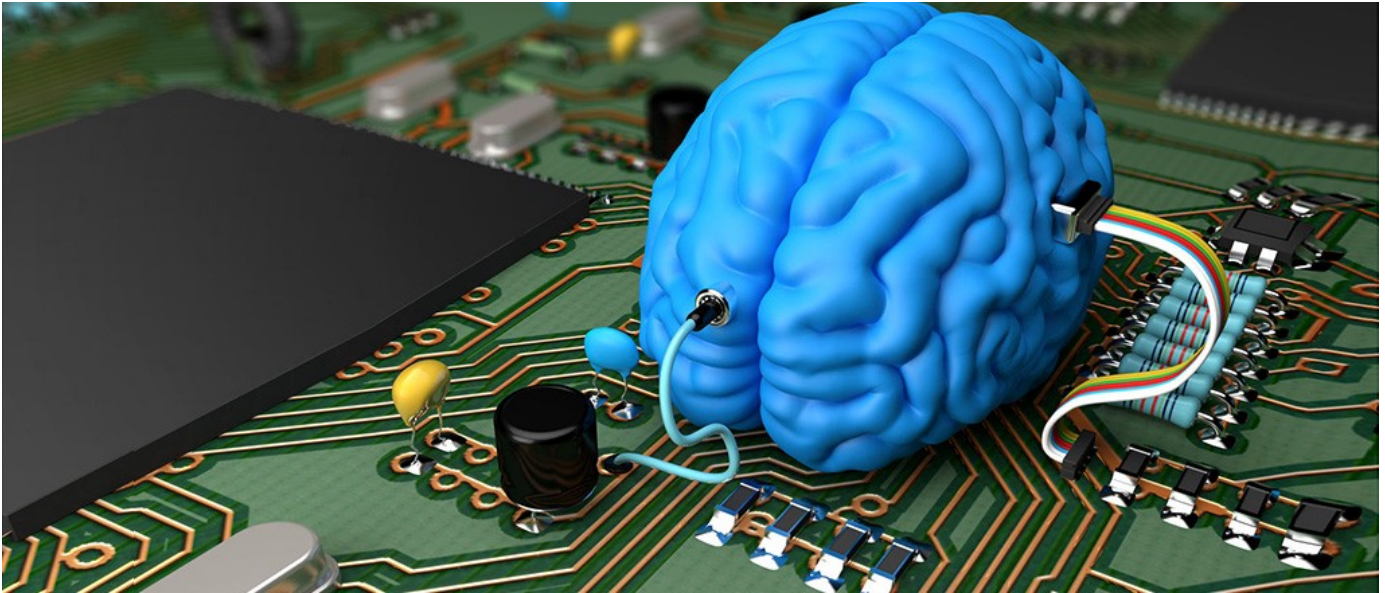
$$y = f(x_1, x_2, x_3, x_4, \dots, x_n)$$

The above equation describes a function $f()$ which takes different arguments from x_1 to x_n and which gives the output as **TRUE/FALSE**. these functions can be linear functions or any polynomial functions like functions with any degree.

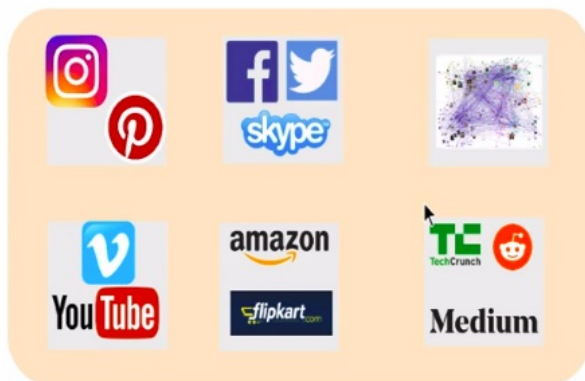
Main Advantages and keys of Machine Learning:



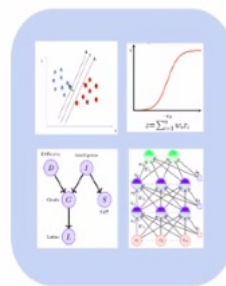
Government data sets on ML



1.DATA : Abundant data is available any many data sets are available and easily accessible online like kaggle,Google.



Abundant data



Democratized model and Learning Algorithms



Relatively fast and cheap cloud/computing

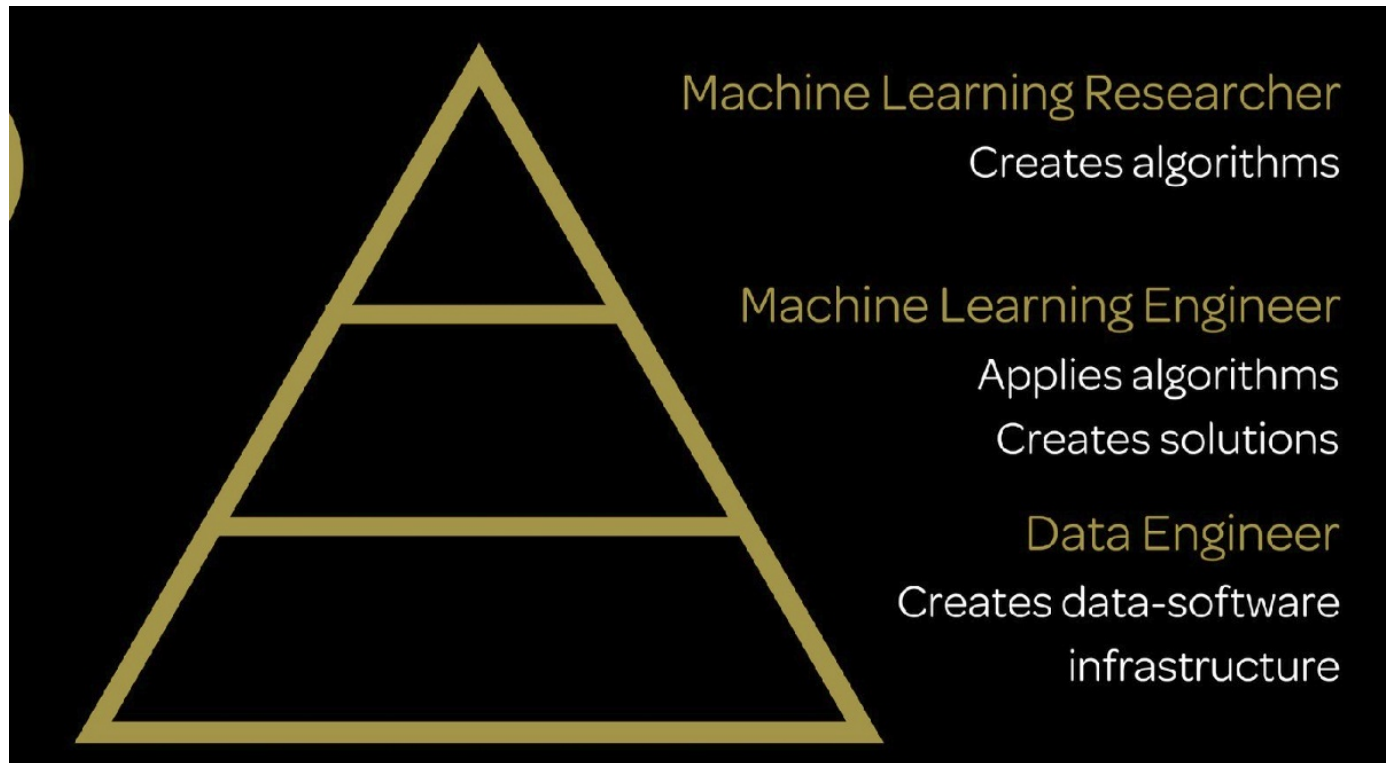
Why machine Learning is successful??

2.DEMOCRATIZATION: Various APIs from Microsoft,Google,IBM can be used we can feed in data which give us various parameters for the solution function

3.DEVICES: If u dealing with large amount of data dealing with complex functions and trying to

learn the parameters this is a very complex process which cannot be done on CPU's or normal computers. But we can use various cloud computing devices available like Google Colabs, AWS Cloud and you can also use GPU's.

Different Roles in World of ML:



All that is important is where do you lie in this world machine learning. Which role do you play??.

The beside is the hierarchy of different roles in ML classified into 3 different stages.

Stage 1(Data Engineer): This is collecting Data-level,Defining Goals,Features of the project.

Stage 2(ML Engineer):With all the data tuning some models models and suggesting the best models.

Stage 3(ML Researcher): New Fast,efficient and better algorithms writing and building better models.

Humans can typically create one or two good models a week; machine learning can create thousands of models a week.
